

WHAT WE CLAIM IS:

1. A composite door skin structure, comprising:
about 40 weight percent to about 80 weight percent thermoplastic polymer;
up to about 30 weight percent glass fibers; and
5 a filler selected from (a) about 5 weight percent to about 40 weight percent
mineral filler and (b) about 10 weight percent to about 50 weight percent organic fibrous
additive.
2. The composite door skin structure of claim 1, wherein the composite door
10 structure comprises a molded door facing.
3. The composite door skin structure of claim 1 or 2, wherein the molded
door facing has a rectangular periphery and substantially planar interior and exterior
surfaces facing away from one another.
- 15 4. The composite door skin structure of any one of claims 1-3, wherein the
exterior surface comprises a plurality of panels.
5. The composite door skin structure of claim 3 or 4, wherein the interior
20 surface comprises a plurality of reinforcing ribs.
6. The composite door skin structure of claim 5, wherein the reinforcing ribs
extend diagonally between adjacent panels.

7. The composite door skin structure of any one of claims 1-6, wherein the thermoplastic polymer constitutes about 50 weight percent to about 80 weight percent of the composite door structure.

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8. The composite door skin structure of any one of claims 1-7, wherein the thermoplastic polymer comprises impact grade polypropylene.

9. The composite door skin structure of any one of claims 1-8, wherein the
10 thermoplastic polymer comprises polystyrene.

10. The composite door skin structure of any one of claims 1-9, wherein the glass fibers constitute about 5 weight percent to about 30 weight percent of the composite door structure.

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11. The composite door skin structure of any one of claims 1-10, wherein the glass fibers constitute about 10 weight percent to about 30 weight percent of the composite door structure.

20 12. The composite door skin structure of any one of claims 1-11, wherein the glass fibers have a length of between about 3 mm to about 7.62 cm.

13. The composite door skin structure of any one of claims 1-12, wherein the mineral filler constitutes about 10 weight percent to about 30 weight percent of the composite door structure.

5 14. The composite door skin structure of any one of claims 1-13, wherein the mineral filler constitutes about 20 weight percent to about 30 weight percent of the composite door structure.

10 15. The composite door skin structure of any one of claims 1-14, wherein the mineral filler comprises mica.

16. The composite door skin structure of any one of claims 1-15, wherein the organic fibrous material constitutes about 10 weight percent to about 40 weight percent of the composite door structure.

15 17. The composite door skin structure of any one of claims 1-16, wherein the polymer has a melt flow index at 230° C of between about 0.5 g/10 min to about 500 g/10 min.

20 18. The composite door skin structure of any one of claims 1-17, wherein the molded door facing has a coefficient of thermal expansion of between about $20 \times 10^{-6} / ^\circ \text{C}$ to about $40 \times 10^{-6} / ^\circ \text{C}$.

19. The composite door skin structure of any one of claims 1-18, wherein the molded door facing has a stiffness between about 400,000 to about 2.0 million pounds per square inch (psi).

5 20. The composite door skin structure of any one of claims 1-19, wherein the molded door facing has an impact strength of between about 1.5 foot pounds to about 7.5 foot pounds.

10 21. The composite door skin structure of any one of claims 1-20, wherein the molded door facing has a toughness of between about 5.0 foot pounds to about 25.0 foot pounds.

22. A door comprising:
a frame having opposite first and second sides;
15 first and second molded door skins fixed to the first and second sides, respectively, at least one of which comprises the molded door skin of any one of claims 1-21; and
a core component situated between the first and second molded door skins.

20 23. A door comprising:
a frame having opposite first and second sides;

first and second molded door skins fixed to the first and second sides,
respectively, each of the first and second molded door skins respectively comprising the
molded door facing of any one of claims 1-21; and

a core component situated between the first and second molded door skins.

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24. A method of making the composite door structure of any one of claims 1
to 21, comprising:

extruding a composition comprising about 40 weight percent to about 80 weight
percent thermoplastic polymer, up to about 30 weight percent glass fibers, and a filler
10 selected from (a) about 5 weight percent to about 40 weight percent mineral filler and (b)
about 10 weight percent to about 50 weight percent organic fibrous additive; and

forming the extruded composition into the composite door skin structure of any
one of claims 1 to 21.

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25. The method of claim 24, wherein said forming step comprises
compression molding the extruded composition.

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26. The method of claim 24, wherein said forming step comprises
thermoforming the extruded composition.

27. The method of claim 24, wherein the thermoforming step comprises
pressure forming.

28. A method of making a door, comprising:

extruding a composition comprising about 40 weight percent to about 80 weight percent thermoplastic polymer, up to about 30 weight percent glass fibers, and a filler selected from (a) about 5 weight percent to about 40 weight percent mineral filler and (b) about 10 weight percent to about 50 weight percent organic fibrous additive;

forming the extruded composition into the composite door skin structure of any one of claims 1 to 21, the composite door structure comprising a first door skin; and

assembling the first door skin, a second door skin, a foam core, and a peripheral frame into a door in which the first and second door skins are fixed on opposite sides of the peripheral frame and the foam core is situated between the first and second door skins.

29. A method of making a door, comprising:

extruding a composition comprising about 40 weight percent to about 80 weight percent thermoplastic polymer, up to about 30 weight percent glass fibers, and a filler selected from (a) about 5 weight percent to about 40 weight percent mineral filler and (b) about 10 weight percent to about 50 weight percent organic fibrous additive;

forming the extruded composition into a plurality of the composite door skin structures of any one of claims 1 to 21, the composite door skin structures comprising a first door skin and a second door skin; and

assembling the first door skin, the second door skin, a foam core, and a peripheral frame into a door in which the first and second door skins are fixed on opposite sides of

the peripheral frame and the foam core is situated between the first and second door skins.